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ABSTRACT

This overview of an introductory, graduate level course in instructional systems design taught at Southern Illinois University-Edwardsville stresses the point that professors of instructional design need to utilize the concepts, principles, and procedures which they present in their courses. Special attention is given to the analysis, development, and evaluation stages. Instructional procedures that are typically used are described, and a flowchart model of the course is analyzed. (Author/CMV)

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"The Teaching of Instructional Systems Design: Alternative Procedures"

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Introduction

A system is a complex unity of parts related to each other in a manner that serves a common purpose. The term implies a search for relationships and ways of optimizing the interaction of components. A systems approach offers a decision-making structure and a set of decision-making strategies. It makes available a self-correcting, logical process for the planning, development, and implementation of man-made entities.

A systems approach is action-oriented. It responds to needs in a logical, orderly manner. It requires that something be done and, when done, that it be evaluated. A systems approach is an analytic rather than an erratic approach. It requires planning and action to be accomplished in a manner that allows participants to revise the plans, as action and experience proceed, and incorporate constructive improvements. A systems approach requires initiative and commitment.

Today, systems concepts are increasingly being applied to the development of instruction. The application of these concepts to educational problems is often referred to as Instructional Design and/or Instructional Development. Many articles and other scholarly works have been produced over the last decade explaining different views and procedures that are important to the process. In fact, different terminology and different interpretations have in many cases caused at least a mild confusion within the educational community. Some confusion is always expected in an emerging field and this is especially true when the technology is being developed by many people of highly diversified backgrounds.

Although terminology, interpretations, and sequences vary from source to source, several basic elements, aspects or steps are significant in applications of systems concepts to problems of education and specifically of instructional development. Broad goals, needs, objectives, constraints, alternatives, selection, implementation, evaluation, and modification are generally accepted as the elements of systems approaches in education. Each element is initiated by human action, has a particular intent and function, and is related to the other elements. Each element is a field of study in itself and is represented by a body of literature and information composed of factual descriptions, concepts, generalizations, and principles that can be submitted to further analysis and interpretation.

It is important to emphasize that any systems approach is a process, a means, a way of achieving something; it is not the product itself. In instructional development, systems approaches recognize the interaction of the factors and participants engaged in the process and recognize that it is necessary to organize, integrate, and manage those components that contribute to achievement of learning outcomes. This means obligating each human and material resource to make its unique contribution to the teaching-learning situation.

Various academic units in universities are today offering academic courses that center upon the concepts of instructional systems design. Southern Illinois University-Edwardsville is one of these institutions. The remaining part of this paper will focus upon a graduate level course designed at SIUE. The course is referred to as IT 555, Instructional Systems Design.

Course Assumptions

The basic assumptions used in the development of IT 555, Instructional Systems Design are:

--Instruction is goal oriented
--Optimally effective and efficient instruction toward a given goal must be systematically developed, regardless of the nature of that goal.
--There exists a body of knowledge which stems from learning psychology, instructional theory and management science which furnishes useful prescriptive principles for instruction and instructional design.
--The systematic design of instruction is an iterative and interactive process.
--Teaching and the design of teaching are not art forms but largely technical skills which can be learned.
--Prescriptive principles for instruction and instructional design are invariant or constant across subject matter.

Course Content

The content and process of IT 555 Instructional Systems Design, can be represented in the form of the flowchart model shown in Figure 1. There are in the literature many such models, differing widely in complexity and logical structure. For the purpose of our introductory class in instructional design we have found this model to be most useful. Each component of the model is briefly described below:

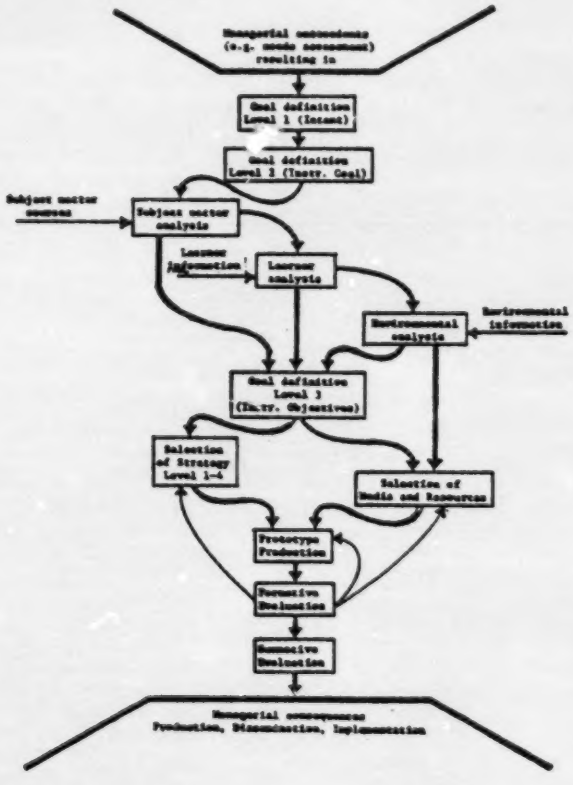

Figure 1.

Goal Definition Level 1. A statement directed toward an instructional intent that is the end-product of a managerial decision making process or of a curriculum development process. Type 1 outcome statements are the least specific type and they are non-behavioral, i.e., they are not formulated in terms of learner performance.

Goal Definition Level 2. A statement directed toward an instructional goal that identifies a class or classes of learned capabilities as the expected outcome of instruction. Type 2 statements are more precise than Type 1 but they are not complete behavioral objectives.

Subject Matter Analysis (Task Analysis). A Goal Definition Level 2 is required before a task analysis can be performed. The results or products of a task analysis are two:

1. A clear, complete and concise description of the performance the learner is supposed to exhibit.

2. A learning hierarchy; or an instructional map that presents an ordered list or schema of prerequisite internal conditions.

This means that the user must know whether the outcome is an intellectual skill (and the interrelationship of the 8 types of intellectual skills), a motor skills, an attitude, a cognitive strategy or simply information.[1]

Learner Analysis. Major purpose of the learner analysis is to determine the initial state of the learner as it relates to the terminal skill(s) to be learned. Learner characteristics that are examined are:

1. Entry skills
2. Abilities/aptitudes
3. Learner motivation
4. Socio-Cultural background
5. Perceptual factors
6. Learner values and beliefs
7. Learner Load

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[1] Robert M. Gagné and Leslie J. Briggs, Principles of Instructional Design (New York: Holt Rinehart and Winston, Inc., 1974), pp. 19 - 71.

Environmental Analysis. Predesign analysis is undertaken with the purpose of obtaining a complete information basis on the current state of three major components that will eventually be joined in an instructional system. These three components are the subject matter, the learner, and the environment. The environment can be subdivided into seven major areas or categories:

1. Facilities
2. Equipment
3. Software
4. Commodities
5. People
6. Time and money
7. Politics, policies, and legalities

Goal Definition Level 3. This type of outcome statement is the well-known behavioral objective. This statement can only be written after the analytical phase. The specific characteristics of subject matter, learner and environment influence the ultimate learning outcomes that the designer can aim toward.

Selection of Instructional Strategy. Instructional strategies are prescriptions for the sequence and form of those instructional elements which lead from the learners' initial state (entry skills) to the desired terminal state as defined by a given instructional objective. IT 555, Instructional Systems Design examines the following three levels of instructional strategies:

Level 1. Sequencing of enabling objectives. Analysis of the subject matter yields a list of prerequisite learned capabilities and their interrelationships. A typical outcome of a subject matter analysis (but by no means the only possible outcome) is a learning hierarchy.[2]

Level 2 Sequencing of facilitative objectives. Facilitating objectives are objectives that define skills which are assumed to facilitate the acquisition of a given enabling or terminal skill but which are not necessary from a purely logical point of view.

Level 3 Selecting and sequencing of instructional events. The terminal objective is reached via a number of enabling and facilitating objectives. Any particular enabling or facilitating objective is reached via a variable number of instructional events. Gagne' distinguishes between nine classes or types of instructional events:[3]

1. Gaining attention
2. Informing the learner of the objective
3. Stimulating recall of prerequisite learning
4. Presenting the stimulus material
5. Providing "learner guidance"
6. Eliciting the performance
7. Providing feedback about performance correctness
8. Assessing the performance
9. Enhancing retention and transfer

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[2] Ibid., PP. 99 - 119.
[3] Ibid., PP. 121 - 136.

Selection of Media. The selection of media is discussed under the assumption that the following five dimensions of an instructional product have been determined:

1. The learner population is described and analyzed;
2. The subject matter has been defined and analyzed;
3. The environment has been surveyed;
4. The objectives are defined;
5. A strategy has been defined.

Prototype Production. Prototype production is examined on two levels. Level 1 examines the assembling of materials that are already developed and completing designs for their tryout. Level 2 examines designing and producing all new materials for an instructional module and completing designs for their tryout.

Evaluation. The course model views evaluation as a continuous process of collecting and interpreting information in order to assess decisions made in designing an instructional system. Therefore, information about three topics are discussed:

1. Pre-testing. The achievement level of students entering the instructional system;
2. Summative Evaluation. The achievement level of students learning the instructional system;
3. Formative Evaluation. The effectiveness and efficiency of instructional procedures employed in the learning system.[4]

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Instructional Procedures

Southern Illinois University-Edwardsville has found the student enrollment in I.T. 555, Instructional Systems Design, to be a highly diversified one. At the present time, four departments require the course as part of the Master's Degree in Education. They are: 1. Instructional Technology, 2. Secondary Education, 3. Elementary Education and 4. Educational Administration. In addition, numerous departments such as Special Education and Nursing use the course as an elective. The student population becomes even more diversified when one considers that these students are employed in public schools, community colleges, training programs, medical and health education and others.

Requirements The major requirement for I.T. 555, Instructional Systems Design, is for each student to generate an instructional unit that makes use of the principles and procedures learned in the course. This end product has proved to be a valid indicator of student progress. Additional requirements are also used for continuous evaluation, however, they tend to change from term to term.

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[4] Robert H. Davis, Lawrence T. Alexander, and Stephen L. Yelon, Learning Systems Design (New York: McGraw Hill Book Company, 1974) pp. 80 - 127.

Instructional Strategy

Sequencing. Course content is sequenced in the following manner:

1. Historical and Theoretical background of instructional systems design.
2. Defining instructional outcomes.
3. Taxonomies of learning and their implications for instructional design.
4. Task Analysis Procedures.
5. Learner Analysis Procedures
6. Environmental Analysis Procedures
7. Instructional Strategy Components of instructional design.
8. Selection of Media for instructional events
9. Evaluation Procedures

Instructional Events and Materials. The course is taught every quarter, sometimes with multiple sections. Approximately 25 students are enrolled in each section. Normally the class meets one night a week, for three hours over an eleven week term.

The course has been developed around a set of nine instructional modules which includes the nine topic areas that are listed directly above. All nine modules are given to students at the first class meeting. The modules contain the following components:

1. Instructional Objectives
2. Summary of content that related to the objectives
3. Assigned readings that relate to the modules
4. List of other assigned resources to be used independently
5. Post Test and answers for immediate feedback
6. List of additional resources that student may pursue if they select.

Class sessions are sub-divided into components that include:

1. Class Lectures and Presentations. Lectures and presentations are designed around the content of the modules. The lecture and presentation are usually kept to 40 minutes or less.

2. Appropriate Practice. Each class period has been designed to provide students with opportunities for appropriate practice. These activities are usually simulated ones which enable students to practice the essential learned capabilities. The simulation activities generally require three to four students to work together. A debriefing session is always included as part of the activity. The amount of time used for this portion of the class is naturally varied.

3. Question/Answer Session. Approximately one hour of each class meeting is devoted to a question/answer session. This period of time is used for two purposes: 1. To respond to questions that students may have that relate directly to the principles and procedures presented in the modules, and 2. To examine in more depth the theoretical constructs of instructional systems design and opposing instructional theories.

4. Lab Session. A lab session is provided as a consultation period for individual students. Primary function of the lab session is to examine the work that each student has completed on their final product. Feedback about their progress is continuously provided to the student through this procedure.

Summary

The purpose of this paper is to present an overview of a course taught at Southern Illinois University-Edwardsville, entitled IT 555, Instructional Systems Design.

The major point being stressed is that professors of instructional design need to utilize the concepts, principles and procedures which they present in their courses.

Special attention needs to be given to subject matter analysis (task analysis), learner analysis, and environmental analysis.

After the analysis stage has been completed, the professor needs to develop an appropriate instructional strategy and must continuously evaluate the product and process for possible modification. Instructional procedures used at Southern Illinois University-Edwardsville are presented in the paper.

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